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# PATENT SPECIFICATION

DRAWINGS ATTACHED

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## COMPLETE SPECIFICATION

### Improvements relating to Vacuum Electric Switches

We, ASSOCIATED ELECTRICAL INDUSTRIES LIMITED, a British Company having its registered office at 33 Grosvenor Place, London, S.W.1., do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to vacuum electric switches.

A vacuum electric switch commonly comprises a vacuum chamber (also referred to as a vacuum envelope) with two electrically conducting means extending into the chamber and electrically insulated from one another by the chamber, which is for this purpose at least partially made from an electrically insulating material, for example porcelain. Generally, one of the conducting means is fixed with respect to the chamber and the other conducting means extends freely through an aperture in the wall of the chamber in a gas sealed manner so as to permit relative movement between the conducting means and the chamber such that inner ends of the conducting means in the chamber can abut and be separated so that the switch can pass and interrupt electric current, respectively. The movement of the movable conducting means is achieved by a suitable mechanical device located outside the chamber and guide means are provided for the movement of the movable conducting means.

According to the present invention a vacuum electric switch comprises a vacuum chamber, two electrically conducting means electrically insulated from one another and extending into the chamber in gas sealed manner, the conducting means being movable relative to one another such that contact making surfaces of the two conducting means in the chamber can be engaged and separated to close and

open the switch respectively, a body of electrically insulating material moulded around the chamber and forming a mounting means by which the switch can be secured to a supporting structure. Preferably, guide means are at least partly carried by said body of insulating material to guide movement of said movable electrically conducting means outside the chamber.

Preferably the moulded insulating material is an epoxy resin.

Where flame-proof requirements are to be satisfied the moulded insulating material conveniently forms a flange adapted to be secured to a mounting structure surrounding the switch and is shaped to form therewith a flame-proof seal. Any fragile gas-tight seal(s) between component parts of the switch covered by the moulded insulating material are preferably protected by a buffer covering of resilient material, for example a silicone rubber, between said seal(s) and the moulded insulating material.

One embodiment of vacuum electric switch according to the invention will now be described by way of example with reference to the drawing filed with the Provisional Specification, in which:—

Fig. 1 is a side view, half-sectioned on an axial plane, of a vacuum switch together with a mounting arrangement embodying the invention; and

Fig. 2 is a plan view from below of the switch illustrated in Fig. 1.

In the drawing there is shown a vacuum electric switch comprising a vacuum chamber having a generally cylindrical porcelain body portion 1 and metal end plates 2 and 3. The end plate 2 is secured with a gas-tight seal at 4 to an annular collar 5, the outer edge of which is secured with a gas-tight seal at 6 to one end of the body portion 1. A fixed conductor 7 extends in a gas-tight manner through

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the end plate 2 and forms at its inner end a fixed contact 8.

5 The end plate 3 is secured with a gas-tight seal at 11 to the other end of the body portion 1 and a movable conductor 12 extends freely through an aperture 13 in the end plate 3 in a gas sealed manner by means of a bellows member 14. The inner end of conductor 12 forms a movable contact 15.

10 The movable conductor 12 extends through a guide 16 supported from the end plate 3 on a collar 17 and its outer end 18 is adapted to be connected to a mechanical device which provides longitudinal movement of the conductor 12 so that the contacts 8, 15 can abut or can be separated.

15 An electrical connection is in this instance made to the conductor 7 through a pivotted isolator switch contact system shown in part at 19 of any well known type and electrical connection is made to the conductor 12 by any suitable means not illustrated. Alternatively the connection to 7 may be a direct cable connection 19'. By means of these connections to the conductors, the switch can be connected 20 into associated electrical equipment so as to be closed or opened to pass or interrupt electric current as required.

25 The vacuum switch is mounted by means of a mass 21 of epoxy resin moulded around the envelope so as to fit closely over the surface thereof and is formed with an integral flange 22 adapted to be secured to a suitable frame 23 of a supporting structure. A buffer layer 24 30 of resilient silicone rubber is moulded over the seals 4, 6 before the epoxy resin mass is moulded in position. A plate 25 is supported from the mass 21 by rods 26 and a central aperture in the plate 25 accommodates the guide 16 for the movable conductor 12. One 35 end of each of these rods 26 is moulded into the mass 21 and the other end of each of the rods is threaded for nuts 27, 28 which are used to secure the plates 25 in position.

40 The just described mounting provides a firm support for the envelope of the switch. The additional buffer layer 24 provides resilient protection for the gas-tight seals 4 and 6 and the plate 25 provides additional support 45 for the guide for the movable conductor 12. The mounting therefore protects the vacuum switch assembly against external shocks and simplifies the fitting of the switch into a supporting structure.

50 When the switch is to be used in equipment 55 in which the flame-proof requirements must

be satisfied, the outer surfaces of the mass 21 of epoxy resin can be shaped so that the seal between the mass 21 and the frame 23 in the region of the flange 22 is a frame-proof seal. 50

#### WHAT WE CLAIM IS:—

1. A vacuum electric switch comprising a vacuum chamber, two electrically conducting means electrically insulated from one another and extending into the chamber in a gas sealed 65 manner, the conducting means being movable relative to one another such that contact making surfaces of the two conducting means in the chamber can be engaged and separated to close and open the switch respectively, and a body of electrically insulating material moulded around the chamber and forming a mounting means by which the switch can be secured to a supporting structure. 70 75

2. A vacuum electric switch as claimed in Claim 1, in which guide means are at least partly carried by said body of insulating material to guide movement of said movable electrically conducting means outside the chamber. 80

3. A vacuum electric switch as claimed in Claim 1 or Claim 2, in which the insulating material is an epoxy resin.

4. A vacuum electric switch as claimed in Claim 1 or Claim 2 or Claim 3, in which the moulded insulating material forms a flange shaped so as to provide a flame-proof seal between the insulating material and a surrounding supporting structure. 85 90

5. A vacuum electric switch as claimed in any one of the preceding claims, in which any fragile gas-tight seal(s) between component parts of the switch covered by the moulded insulating material are protected by a buffer covering of resilient material between said seal(s) and the moulded insulating material. 95

6. A vacuum electric switch as claimed in Claim 5, in which the buffer covering of resilient material is a silicone rubber. 100

7. A vacuum electric switch substantially described with reference to and as illustrated in the drawing filed with the Provisional Specification.

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